

The USDA California Climate Hub

Actionable Climate Information for California Farmers, Ranchers, and Foresters

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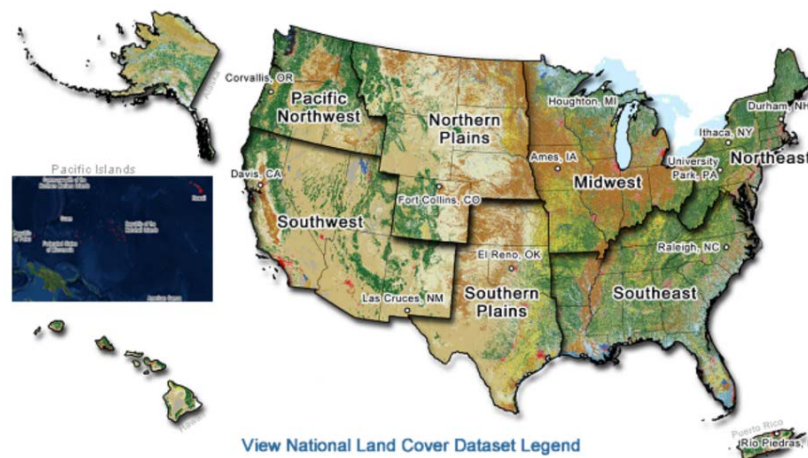
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www.climatehubs.oce.usda.gov/california

USDA Climate Hubs Mission

Develop and deliver region-specific, science-based information and technologies for *California's* farmers, ranchers and foresters to enable climate-informed decision-making and provide access to assistance to implement those decisions.



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The Challenge and Approach

Science and Research

Resource Managers

Climatic Change
DOI 10.1007/s10584-007-9367-8

Accumulated winter chill is decreasing in the fruit
growing regions of California

Dennis Baldocchi • Simon

Ecology 98(6), 2011, pp. 1548–1559
© 2011 by the Ecological Society of America

Received: 2 August 2006 / Ao
© Springer Science + Business

Abstract We examined t
of central California and
warming is in motion in
across the fruit and nut g
accumulated winter chill
climate datasets. The C
contains hourly climate i
chill degree-hour. But,
National Weather Service

Fire Ecology Volume 12, Issue 1, 2016
doi:10.1007/s12010-016-0013

RESEARCH ARTICLE

DOES PRESCRIBED FIRE PROMOTE RESISTANCE TO DROUGHT IN LOW
ELEVATION FORESTS OF THE SIERRA NEVADA, CALIFORNIA, USA?

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ABSTRACT

Prescribed fire is a primary tool used
to restore western forests following
more than a century of fire exclusion,
reducing fire hazard by removing
dead and live fuels (small trees and
snags). It is commonly assumed that
the reduced forest density following
prescribed fire also reduces competi-
tion for resources among the remain-
ing trees, so that the remaining trees
are more resistant (more likely to sur-
vive) in the face of additional stressors,
such as drought. Yet this proposi-
tion remains largely untested, so that
managers do not have the basic infor-
mation to evaluate whether prescribed
fire may help forests adapt to a future
of more frequent and severe drought.

During the third year of drought, in
2014, we surveyed 9950 trees in 38
burned and 18 unburned mixed conifer
forest plots at low elevation
(<2100 m a.s.l.) in Kings Canyon, Se-
quoia, and Yosemite national parks in
California, USA. Fire had occurred in
the burned plots from 6 yr to 28 yr be-

Climate change may restrict dryland forest regeneration
in the 21st century

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Abstract. The persistence and geographic expansion of dryland forests in the 21st century
will be influenced by how climate change supports the demographic processes associated with
tree regeneration. Yet, the way that climate change may alter regeneration is unclear. We
tested (RPT) as a
stress species. We
tested this across
size classes. Our
findings, made in
2006, suggest
that dryland forests

van Mantgem et al.: Does Prescribed Fire Promote Resistance to Drought?
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RESUMEN

El fuego prescrito es una herramienta primar-
dial utilizada para restaurar los bosques del oeste
de los EEUU luego de más de una centuria
de exclusión del fuego, reduciendo el peligro de
incendios mediante la remoción de combusti-
bles vivos y muertos (pequeños árboles y arbo-
rescentes). Se asume comúnmente que la reducción
en la densidad del bosque luego de un fuego
prescrito también reduce la competencia por
los recursos entre los árboles remanentes, de
manera tal que éstos son más resistentes (tienen
más probabilidad de sobrevivir) frente a un es-
trés adicional como la sequía. Sin embargo esta
suposición permanece aún sin verificar, por lo
cual los gestores no tienen información básica
para evaluar si el fuego prescrito puede ayudar
a los bosques a adaptarse a un futuro con se-
quías más frecuentes y severas.

Durante el tercer año de sequía, en 2014, re-
levamos datos de 9950 árboles en 38 parcelas
quemadas y 18 parcelas sin quemar en bosques
mixtos de coníferas de elevaciones bajas
(<2100 msnm) en los parques nacionales de
Kings Canyon, Sequoia y Yosemite en Califor-
nia, EEUU. El fuego había ocurrido en las par-
celas quemadas entre 6 años y 28 años antes de



Boundary organizations - USDA Climate Hubs



Photo: USFS

Climate Change and Forest Management

For the first time in the history of natural resource management, global stressors including *Climate Change* may have a greater influence in shaping our ecosystems than land use practices.

Sensu: Millar et al. 2007



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SAVE THE DATE

Science and Management Symposium

Lessons learned from extreme drought and tree mortality in the Sierra Nevada: How can past events inform our approach forward?

Tuesday, July 25, 2017

USFS Wildland Fire Training & Conference Center, Thirty Mile Room (N106)

Register at <https://drought-treemortality-symposium.eventbrite.com>

Lodging Options: [Lions Gate Hotel](#), [Crowne Plaza](#) and [La Quinta](#)

Please join the USDA California Climate Hub, US Forest Service Region 5, National Forest Foundation, CAL FIRE, the Sierra Nevada Conservancy, and the California Landscape Conservation Cooperative for a Science and Management Symposium on lessons learned from extreme drought and tree mortality in the Sierra Nevada. The Forest Service estimates that over 100 million trees have died in California in just the last half decade. This tree mortality event has been attributed to the combined effects of historical land management practices, including fire suppression, drought, and insect outbreaks.

This science and management symposium will provide a forum where experts and managers can share findings, results, and experiences from this tree mortality event to help frame future forest management. We will address questions including: *What are the past events that contributed to tree mortality?*; *What are the expected conditions for the future?*; and *What are our options for future forest management?*



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Guiding Questions

- What are the past events that contributed to tree mortality? ([Session one](#))
- What are the conditions, activities, and actions that influenced patterns of tree mortality and survival on the landscape? ([Session two](#))
- What are the expected conditions for the future? ([Session three](#))
- What are the options for future forest management? ([Expert breakouts](#))

Session One: Considerations of the Past & Expectations of the Future

Purpose

To provide an overview and understanding of the historic drought and tree mortality in California Forests

Outcomes

- Removal of fire, logging, warming, densification, changed precipitation patterns, insect activity...
- Droughts are part of the - process not fixed – climatic extreme.
- CA die off event is unique compared to other N.A. systems, historically fire killed more trees – may not be the case now.



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Session Two: Patterns & Drivers of Tree Mortality: From the Tree to Landscape

Purpose

Taking a closer look at factors that led to patterns of mortality and survivorship: considering what lived, what died, where and what might have influenced the result?

Outcomes

- Mortality was/is age-size, species, density, site (CVD) specific.
- Mech. Trt. less effective in south (more xeric).
- Beetles have preferences.
- Mortality – fire relationship not clear.
- Expect new threats with climate change and climatic extremes.



Session Three: Moving Forward with Changed Conditions: The Future of California Forests with Climate Change & Extreme Events

Purpose

An overview of future conditions that will affect California Forests, including increased temperatures, changed precipitation patterns, and increased climatic water deficit, and provide a vision for future management approaches.

Outcomes

- Possible novel ecosystems – CC will drive changes.
- Desired conditions? (vs. unacceptable conditions). Paradigm shift.
- Climate / Drought interactions.
- Increased variability.
- Thorne et al. – moderate to critical and high critical threats to key forest systems in CA.
- CC real threat, need more fire, silviculture treatments,
- Breaking barriers important for treating more land.
- Push the system – change required.



Expert Breakout Sessions

Reforestation

Where, what and how
to plant?

Seed zones – valid or
update?

Genetics...

Fire IS critical
ecological process

Current backlog of
reforestation

Landowners need
assistance



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Expert Breakout Sessions

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Where, what and how to plant?

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Landowners need assistance

Fire and Fuels

Capacity – Scale of Managed or Rx Fire

Social acceptability & education of public

Strike team concept

Fire as part of the system



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Expert Breakout Sessions

Reforestation

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Social acceptability & education of public

Strike team

Fire as part of the system

Partnerships & Opportunities

Capacity – FS lacks resources to manage landscape

Time, relationships, trust

Need to engage line officers

Develop platforms for cooperative partnerships



Next Steps

- Day two summary – prioritization of actions
- AGU Abstract submitted – Science into Action
- Forum Paper: History of and Factors Associated with the SN Tree Mortality Dynamic (proposed)
- Symposium Fact Sheet (in prep, proposed)
- Workshops
 - Climate effects on Forests (recurring)
 - Reforestation/Re-vegetation
 - Fire and Fuels Management
- Climate Smart Reforestation Guidebook/Workbook
- Applying the Science Fact Sheets for Line Officers (proposed)
- Adaptive Silviculture Treatments for Climate Change (Transition, Resistance and Resilience) – (Suggested)



Climate Change and Forest Management

Accepting that the future will be different from both the past and the present forces us to manage forests in new ways.

MILLAR, STEPHENSON & STEPHENS 2007



USDA Regional Climate Hub, California

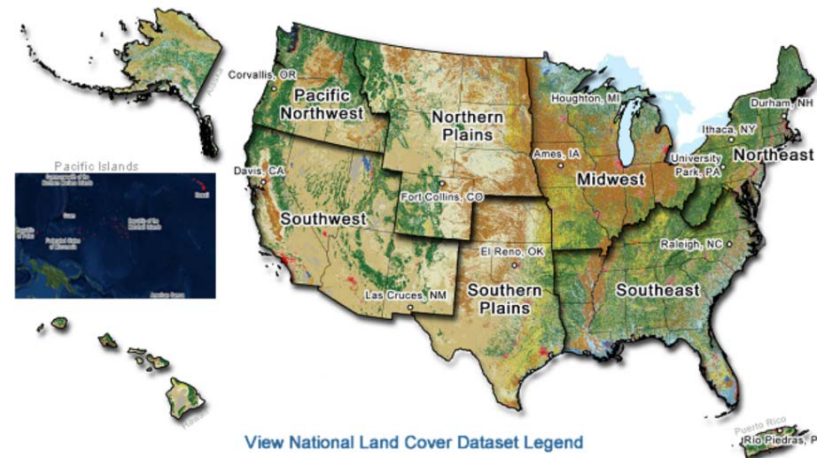
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Climate Information Resources

- Cal Adapt: <http://cal-adapt.org/>
- Climate Commons (CA LCC):
<http://climate.calcommons.org/>
- USGS Climate Science Center:
<http://www.swcsc.arizona.edu/fact-sheets>
- California Vegetation Assessment (Throne et al. 2016, Schwartz et al. in press): Link provide in notes.
- USDA Regional Climate Hub Vulnerability Assessment: Southwest and California: Link provide in notes.
- Point Blue Conservation Science/Climate Smart Conservation: <http://www.pointblue.org/priorities/climate-smart-conservation/>

